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The MONTHLY REVIEW

Published Monthly by the

American Electro-Platers Society

A SOCIETY FOR THE ADVANCEMENT
OF THE
SCIENCE OF ELECTROPLATING

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MONTHLY REVIEW

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Publication and Editorial Office

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VOL. XIX FEBRUARY, 1932 No. 2

EDITORIAL

Help the Research Fund

The following letter was sent to the Treasurer of the Research Fund which we are glad to print for the benefit of our readers:

January 11, 1932.

"MR. WALTER FRAINE,
Secretary-Treasurer, Research Fund,
507 Grand Ave., Dayton, Ohio.
Dear Mr. Fraine:

In answer to a letter of January 8th from Mr. Jacob Hay, Chairman, Chicago Branch is pleased to advise that it will grant the request of a loan until such time as the Union Trust Company will open its doors and resume payments.

Enclosed is our check for $250.00 and we sincerely trust that the other branches will come forward in a like manner, as we would not like to see this good work stopped at this stage.

Chicago Branch is heartily in accord with the efforts being made and we hope the research work in 1932 will be of benefit to us all.

Sincerely yours,
Signed: E. G. STENBERG,
Secretary-Treasurer, Chicago Branch."

We surely appreciate the splendid spirit of coöperation as manifested in this letter from Chicago Branch. We are told that

faith without works is dead. In this instance the "windy city" members have demonstrated their faith in the work of the research being done at the Bureau of Standards and by their loan have materially assisted in the solution of the financial difficulties in which the Research Committee finds itself through no fault of its own.

Now, every branch cannot contribute a like amount. Some of our branches for obvious reasons are financially embarrassed. However, we desire to express the wish that all our branches may find ways and means of contributing something to relieve the present situation. Most of our smaller branches should be able to donate from ten to fifty dollars.

Team work always wins. Let's all pull together.

Remember the old saying, "Where there's a will, there's a way." Don't forget the Research Fund at your next branch meeting.

FROM THE SECRETARY-TREASURER'S OFFICE

GREETINGS:

Enclosed you will find a report of the Secretary-Treasurer's office for the first six months of our fiscal year. An analysis of the financial condition of the organization is given to impress you with the necesssity of prompter remittances of per capita tax. You will note that our surplus is dwindling away to such an extent that something must be done to increase our revenue or else we must economize in order to stay within our resources.

It is my opinion that this organization is run as economically as possible with the rendering of the services it extends to its members. During the year each member has been kept posted on the developments of our industry through our reliable and valuable paper, the MONTHLY REVIEW. This publication has cost the society $1359.03 ($466.21 of this amount has been paid since December 1, 1931) for the first six months of this fiscal year. In addition to this you have received two publications: "The Plating of Aluminum" and "The Porosity of Electroplated Chromium Coatings." These papers were mailed to you at the expense of the society. The last paper was mailed to the membership forty-eight hours after it had been received for distribution. What society can you name that does more for its members in

proportion to the nominal dues paid by the members of the A. E. S.?

In addition to this printed matter the society provides stationery for the officers and chairmen of the different committees, compiles reports of the convention proceedings (which last year cost $636.00; copies of these reports are sold to the branches and individuals at cost), advertises the convention, furnishes prize award certificates and the Founder's Gold Medal, pays the officers' salaries and mileage. All these items are provided for out of the $2.10 per year each member pays to the national organization.

From our present membership of 1558 we should receive $816.94 per quarter or $3267.76 a year in per capita tax. This is practically all the revenue the society gets, besides the little it makes on the sale of supplies.

What the Branches Can Do to Relieve the Present Shortage of Funds

(1) Buy more supplies. Some branches have not given their members a revised constitution in ten years or more. Why not order some constitutions? Buy some application blanks and get some new members.

(2) Pay your per capita tax promptly.

If these steps are taken we will be able to pay our obligations for printing, etc., promptly.

Since December 1st there has been received in per capita tax a total of $650.91, which is very encouraging. If the branches now in arrears will do their part in paying their accounts we should be able to report a credit balance at the end of the year. Your officers are all coöperating with this in view. May we have your support?

Sincerely yours,

H. A. Gilbertson.

AMERICAN ELECTRO-PLATERS' SOCIETY
STATEMENT OF CASH RECEIPTS AND DISBURSEMENTS

Six Months Ending November 30, 1931

PARTICULARS		AMOUNT	
Receipts:			
From branches (see schedule attached)			
Per capita tax	$1,033.74		
Sale of convention reports	80.58		
Sale of supplies	53.34	$1,167.66	
On sale of convention reports to members		197.29	$1,364.95
Disbursements for:			
Printing and mailing "Monthly Review"		$892.82	
Convention reporting, printing of reports, letters, etc.		990.44	
Officers' mileage		111.00	
Office expenses—			
President		17.75	
Editor		25.26	
Secretary-Treasurer		41.11	
Supplies for sale to branches		2.50	
Expenses of—			
Education committee		21.21	
Research committee		40.25	
Auditing fee		32.50	2,174.84
Excess of disbursements over receipts			$809.89

RECAPITULATION

Cash on hand—June 1, 1931	$942.73
Cash receipts	1,364.95
	$2,307.68
Cash disbursements	2,174.84
Cash on hand—December 1, 1931	$132.84

AMERICAN ELECTRO-PLATERS' SOCIETY
COLLECTIONS ON AND BALANCES OF BRANCH ACCOUNTS RECEIVABLE

June 1, 1931 to November 30, 1931

	Per Capita Tax				
Branch	*Prior quarters*	*First quarter—1931*	*Convention reports*	*Supplies*	*Balance—Due Nov. 30, 1931*
Anderson	$11.55	$14.18	$3.66	$1.50	$17.26
Baltimore	21.00	21.00	3.59	1.50	21.00
Boston		17.85	3.62	2.82	18.90
Bridgeport	33.60	35.70	3.59	2.60	35.70
Chicago		114.98	3.66	7.14	113.40
Cincinnati					102.34
Cleveland	19.95	19.95	3.66	1.44	21.53
Dayton		18.90	3.66	1.38	18.90
Detroit					141.33
Grand Rapids		17.85	3.71		18.38
Hartford		22.05	3.62		21.53
Indianapolis		7.35	3.66	1.20	6.30
Los Angeles		49.88	3.87	7.06	50.93
Milwaukee		28.35	3.71	1.92	27.83
Montreal	8.92			.96	22.29
New York		64.05	10.77	4.11	73.33
Newark	133.35	67.20	3.59	4.14	64.13
Philadelphia		66.15	3.59	6.00	65.10
Pittsburgh		19.42	3.59	1.20	17.85
Providence	17.33				55.84
Rochester	42.52			2.64	86.58
St. Louis	62.47				61.38
San Francisco	7.88	8.92	3.87	3.45	9.96
Toledo		15.23		.87	18.89
Toronto		33.08	3.92		25.20
Waterbury		21.00	3.62	1.41	21.72
Worcester		12.08	3.62		12.08
Totals	$358.57	$675.17	$80.58	$53.34	$1,149.68

AMERICAN ELECTRO-PLATERS SOCIETY
MEMBERSHIP RECORD

June 1, 1931 to December 1, 1931

Branch	*Total Members June 1, 1931*	*Elections*	*Reinstatements*	*Gain by Transfer*	*Loss by Transfer*	*Suspensions*	*Deaths*	*Resignations*	*Total Members December 1, 1931*
Anderson	23	4		2					29
Baltimore-Wash.	40	2			1		1		40
Boston	34	4							38
Bridgeport	68								68
Chicago	219	4			1	4		3	215
Cincinnati	31					4	1		26
Cleveland	38	3							41
Dayton	36								36
Detroit	84	5				5	1		83
Grand Rapids	33	1	2			1			35
Hartford-Conn.	46				1	4			41
Indianapolis	14				2				14
Los Angeles	93	4							97
Milwaukee	54	1				2			53
Montreal	17	1							18
New York	127					1			126
Newark	128	4				12		1	119
Philadelphia	128	5		1	1	6	1	2	124
Pittsburgh	37					2		1	34
Providence-Attleboro	32								32
Rochester	78	1							79
St. Louis	56			1		3		1	53
San Francisco	15	4							19
Toronto	63					14		1	48
Toledo	29								29
Waterbury	39			1					40
Worcester	24					1			23
Totals	1586	43	2	5	6	59	4	9	1558

ANODIC PHENOMENA IN CADMIUM-PLATING SOLUTIONS

By Gustaf Soderberg

Read at Rochester 1931 Convention

I will first present a few typical problems which have to do with the anodic phenomena in cadmium-plating solutions. I remember quite well my first personal contact with these problems. A user of a Udylite cadmium solution had gone in for plating the inside of long couplings. He had ordered special cadmium anodes, which, when fastened to a frame, were lowered inside the couplings. The current was applied, but after a few seconds it dropped to zero, even when the voltage was raised to 12 volts. The anodes had polarized. That problem was solved by a change in the composition of the solution.

Many such questions have been referred to us from time to time; a recent one is of particular interest, namely the plating of about 30 feet long lighting poles both inside and outside at the same time. I will return to this problem later.

Then we have another set of questions very much related to the former ones, namely the behavior of our Udylite anodes. The combination of cadmium and steel in the construction of anodes was used by the Udylite Process Company as far back as in 1922. These anodes have some very distinct advantages. A decided improvement was made when the ball type anode was brought out, and this anode is now in very general use.

Some time ago, some clever individual figured out that, as about one-third of the anode surface consists of steel, one-third of the current also enters the solution through the steel. He did not observe any evolution of oxygen, and promptly drew the conclusion that one-third of the current was used for the oxidation of cyanide to carbonates. That looks quite reasonable on the surface. A closer examination of the anodic conditions in the bath, however, shows quite a different story.

Now that we have familiarized ourselves with the problems and questions, I will try to show how they were solved and answered. Part of the work here reported is simply a repetition of older researches by Humphries, Pierce and Young; other parts

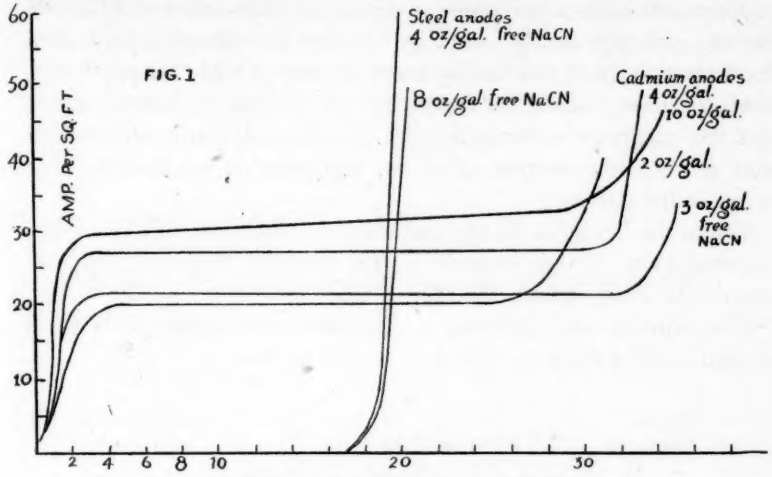
are more original. Most of the experiments were made by Mr. D. B. Stockton.

As a starting point, we may observe the appearance of the anode at different current densities. We find that at normal anode current densities, the cadmium has a grey crystalline appearance. As the current density is increased, this changes into a bright, then burnished appearance. At still higher current densities, the burnished surface is covered with a loosely adherent black powder. At this point, one observes fine gas bubbles on the surface which are disengaged very slowly. Another slight increase in current density causes a distinct increase in the rate of gas evolution, and the formation of a thick, fairly adherent white coating.

If we also observe the voltmeter over the tank, we find that the voltage increases irregularly with the current density. As a matter of fact the voltage is the primary factor, and the current density the resulting function of the voltage applied and the composition of the solution. In general, the tank voltage consists of three component parts: namely, the cathodic polarization, the voltage necessary to overcome the electrical resistance of the solution, which equals I x R, and finally the anodic polarization. If an insoluble anode is used, the decomposition voltage at the anode must be reckoned with.

We have used the Haring cell for the separation of the anodic phenomena from the cathodic polarization and the solution resistance. If precautions are taken to choose the proper mesh gauze and a voltmeter of sufficient internal resistance, the results are easily duplicated.

Fig. 1 shows some of our results from these polarization measurements. It was noted that time is a variable. The points plotted are the values obtained after the current and the voltage had stabilized. You will notice that the polarization on the cadmium anode increases fairly regularly up to a value of about .2 volts, when the current density is increased from 0 to 20-30 amp./sq. ft. At an increase in voltage the current remains practically constant until about 3 volts have been applied. Then it increases again rapidly with the voltage. In other words, in order to get the current density on the anodes higher than 20-30 amp./sq. ft., a very appreciable voltage is necessary. The changes in appearance of the anode take place in this range of rapidly increasing voltage at practically constant current density.



We also find that the current density at which this break occurs depends on the free cyanide content of the solution. This is a factor that has to be controlled quite closely in cadmium plating, although the leeway is much greater than in a copper cyanide solution, the cyanide content of a cadmium solution having an effect mainly on the anodic conditions, and a very small, if any, effect on the cathodic conditions.

I just mentioned that the values plotted were equilibrium values. The time factor is very important at high current densities. Take the solution with 10 oz. free cyanide at 30 amp./sq. ft.:

Minutes	2	7	20	34	39	44	50
Volts	.11	.13	.21	.51	.53	.54	.55

At 35 amp./sq. ft. we find the following relation between time and polarization:

Minutes	1	5	12	15	21	32	36	47	52
Volts	.26	.34	.36	.38	2.22	2.60	3.12	3.00	2.99

The temperature was held practically constant, and the change must be ascribed to the slow changes on the anode surface.

From a practical viewpoint, we may say that much less polarization is encountered on intermittent than on continuous plating.

Now let us see what happens when we substitute a steel anode for the cadmium anode (see Fig. 1). Our first observation is that the bath voltage is practically constant over a wide range of current densities, falling between that of the non-polarized anode and the polarized cadmium anode. Visible oxygen evolution begins at very low current densities, and there is no reason for a break in the curve.

While the behavior of the cadmium anode is dependent on the concentration of free cyanide in the solution, the steel anode is practically independent thereof.

The equilibrium potential is obtained very quickly. With 8 oz./gal. free cyanide and 30 amp./sq. ft. we have:

Minutes	2	7	18
Volts	1.96	1.98	1.96

There is no rapid building up and breaking down of a film as on the polarized cadmium anode. One finds, however, a slow formation of poorly adherent rust on the steel, which in practical plating has to be removed occasionally by scrubbing or pickling.

Having studied the separate behavior of cadmium and steel anodes, let us consider what takes place when both are in the solution together. For the purpose, we studied the current distribution between a cadmium and a steel anode in a solution in which the cadmium anode polarized at about 20 amp./sq. ft.

The set-up was as follows:

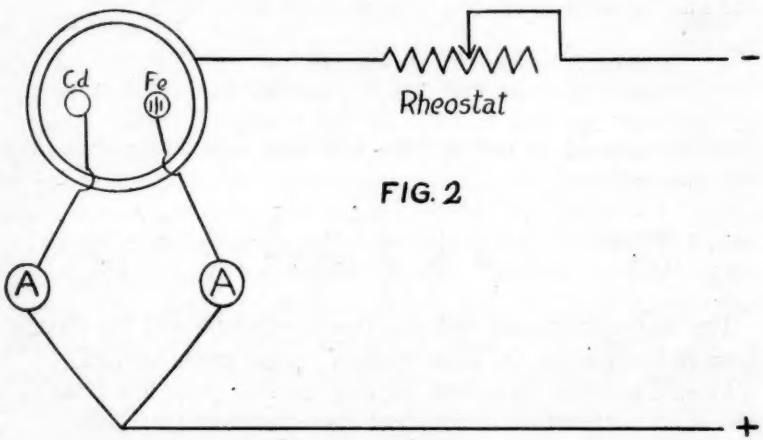


FIG. 2

The area of the two anodes was the same, and the cathode area was very large in comparison. The voltage was adjusted so as to give a certain current density on the cadmium anode at all times, and the current density on the steel anode was measured at frequent intervals, until an equilibrium was reached. The following results were obtained:

Amp./sq. ft. Cd	5	10	15	20	25	30
Amp./sq. ft. Fe	—.02	.00	+.02	1.5	55+	55+

The effect of time can be seen from the following tables:

At 20 amp./sq. ft. on Cd:

Minutes	1	3	8	13	32	39
Amp./sq. ft. on Fe	.43	.29	.50	.72	-1.44	1.44

At 25 amp./sq. ft. on Cd:

Minutes	5	8	14	20	27	30
Amp./sq. ft. on Fe	5.0	7.2	10.5	17.3	33.1	53

At 30 amp./sq. ft. on Cd:

Minutes	1	3	4
Amp./sq. ft. on Fe	36.0	43.2	56.1

Polarization of the cadmium anode was noticed at 20 amp./sq. ft. The anode first turned bright, then black. At 25 and 30 amp./sq. ft. the anode turned white. Thus it can safely be said that no current passes through the steel anode unless the cadmium anode is polarized. This conclusion checks perfectly with the polarization curves in Fig. 1. The minimum voltage necessary for the deposition of oxygen on steel is considerably higher than the voltage available when the cadmium anode is in a normal non-polarized condition.

Then we have the question of oxidation of the cyanide to carbonate at the anode. Following are the results of one series of direct determinations in a solution containing 6.0 oz./gal. free sodium cyanide. The test was run for 149 hours, and 1128 amp. hours were passed through per gallon of solution.

Anode	*Current density amp./sq. ft.*	*Carbonate Content oz./gal.*
None	....	1.53
Cadmium	15	1.53
Cadmium	30	1.51
Cd + equal area of steel	30 caculated on cadmium	1.51
Steel	30	3.82

In an attempt to keep all the solutions at the same temperature, the glass containers were immersed in the same water bath. The only additions made were water to compensate for the evaporation, and new cadmium anodes once a day. These anodes corroded quite considerably, and before each change of anodes the current density had increased to approximately twice that of 15 amp./sq. ft. noted in the table. The cadmium anodes with an original current density of 30 amp./sq. ft. were polarized from the beginning and dissolved much slower. The final current density was about 40-45 amp./sq. ft. Where cadmium plus steel was used, the rate of corrosion of the cadmium was intermediate between the two just mentioned.

To go back to the table of results, I believe that it speaks for itself. In actual practice the amount of current passed through one gallon of solution is much less than 7.57 amp. hr./gal./hour; this 149 hours run would equal 800-1600 hrs. run in an ordinary plating tank, a sufficient period of time from which to draw valid conclusions. It can then safely be said, and this conclusion is backed up by practical experience from the operation of a couple of millions of gallons of solution, that no more carbonates are formed when cadmium-steel anodes are used than when cadmium slabs are employed as anodes. The use of insoluble anodes alone seems to promote the formation of carbonates. No definite conclusions can be drawn, however, from this experiment, as all cadmium had plated out of the solution long before the test was completed. In any case the amount of 2.3 oz./gal. carbonate during 3-6 months of normal operation is not serious, since most of this would be taken away by means of dragout. Carbonate formation is not a question of anode conditions but one of temperature. If the bath is allowed to run down in free cyanide content, the resistance increases and the heating causes decomposition. Too small volumes of solution have the same effect. These remarks apply in particular to barrel plating. The carbonate content of still tank or automatic tank solutions is always very low.

Before I finish, I will go back to that problem I mentioned in the beginning: namely, simultaneous inside and outside plating of 30 feet long lighting poles. The situation was this: The poles had to be plated in a horizontal position in order to keep installation and handling costs down to a reasonable figure, and get the work out quickly. A cadmium slab anode was out of the

question for several reasons, the three main ones being the trouble in making such an anode, its rapid disintegration, and the necessity of slow plating with the small inside anode surface possible. Cadmium anodes with steel supports were out for similar reasons. The only thing left was an insoluble anode of steel.

But we also wanted to use cadmium anodes for plating the outside. Insoluble anodes means that the metal content must be kept up by additions of cadmium salts. Referring back to our polarization curves and our previous discussion, we find that on the simultaneous use of cadmium and steel anodes, the former polarize before any current will pass through the latter. And polarizing cadmium anodes are not much better than insoluble steel anodes from the standpoint of stability of the bath composition.

The problem was solved by means of separate voltage regulation on the soluble and the insoluble anode; the circuit with the steel anode being operated at a voltage about 2 volts above that of the circuit with the cadmium anodes, all according to the graph repeatedly referred to. I may mention that patent has been applied for on this method of cadmium plating with both inside and outside anodes.

(Shows moving picture of plating of 30 ft. lighting poles.)

CHAIRMAN GILBERTSON: Are there any questions?

MR. WHITEHEAD: Did I understand Mr. Soderberg to say that the voltage on the steel was 2 volts higher than that on the cadmium anode?

MR. SODERBERG: Just about two. Not quite. The difference between .3 and 2 volts.

PROGRESS REPORT ON EXPOSURE TESTS OF PLATED COATINGS

By P. C. Strausser

Read at Rochester 1931 Convention

Most of you who are members know at this time of the plans launched by the Research Committee, of the investigation that is being carried on at the present time at the Bureau of Standards. Non-members who are present at this assembly and who are representing manufacturing concerns engaged in the handling of metals, especially in the finishing of such metals, are equally

interested in this project as we are, both morally and financially. I will endeavor to give you a few of the details involved on this research program being conducted at the present time.

The purpose of the test, first, is to learn the relative protective value of the various plated coatings. Second, to learn the value of laboratory tests, and for specifying the quality of such coatings. Our efforts are being concentrated at the present time on the plating of steel, although this investigation will cover other base metals, such as brass, aluminum, and zinc, although we are reserving that to some later date, if conditions permit.

The general plan: There are about 7,000 specimens to be plated at the Bureau of Standards under specified and carefully controlled conditions, and of course under the careful supervision of Dr. Blum. These plated specimens will be exposed at five points throughout the country, namely, Sandy Hook, New York City, Pittsburgh, Pennsylvania State College, Bureau of Standards, of course, and Key West. An inspection of these plates will be made periodically by a joint committee of the American Electro-Platers Society and the American Society for Testing Materials. Laboratory tests will be made on duplicate samples.

Some may wonder just when the inspection of these plates is supposed to be started. We will at the Bureau of Standards make very close inspection of our own racks, and when we see the first indications of breakdown, we will immediately notify the Inspection Committee to go out in the field and make their inspection.

The financial support: The researches outlined at the present time will cost in the neighborhood of $10,000. Of this, the Bureau of Standards is furnishing about $4,000 in salaries and traveling costs; the American Electro-Platers Society about $4,000 in salary and traveling costs of the Research Associate; the American Society for Testing Materials, about $1,000 for racks, which will be used for mounting the specimens in the field, and manufacturers have contributed about $1,000 worth of anodes, steel and plating chemicals.

Dr. Blum outlined in detail some months ago, the conditions which we will use at the Bureau of Standards in plating these specimens. This was presented before the American Electro-Platers Society and representatives of the American Society for

Testing Materials, in Chicago, January 16, which outline was approved after making slight modifications.

The base metal, which I said before, will be steel in the form of cold rolled strip, .032" in thickness. The size of the specimens to be plated is 4 x 6 inches, or 10 x 15 centimeters. In other words, it will comprise an area per plate of one square foot. I have here a sample of the plate which is being used for the program. This is a plate, cut to size, 4 x 6 inches.

Many of you will wonder how we are going to plate this. These will be plated on racks. One rack will carry six plates, two racks being used per plating cycle. In order to hold that plate in a rack, we are cutting a strip off one corner, a quarter of an inch wide, over to a certain distance, and then turning this strip back upon itself, forming a sort of flap. That will be tied in on the rack by means of a nut and bolt and a washer.

Now, the finishes we are going to use. First, nickel deposits will represent about thirty variations. That means to say we will use alternate layers of nickel, copper, nickel, or copper, nickel, plus chromium, and so forth. That is, the thickness of deposit of nickel will vary from 2½ to 25 microms, or .0002 to .002 of an inch. These nickel plates will also be plated under deposition conditions and combinations as stated before.

Chromium plate. About forty kinds of chromium will be used, including the same variations as nickel, and also variations in chromium, such as the different chromic acid/sulphate ratios, temperature and current conditions. Dr. Blum's paper has a very close bearing on this particular project. We will use all these variables, as you see here. [Indicating chart.]

Next, zinc plating. There will be about twenty kinds of zinc, including the acid and cyanide baths, various thicknesses and current densities.

Next, cadmium. About ten kinds will be used.

Next, zinc-cadmium alloys. About five kinds, which will make a total of about 110 variations.

Now, five samples, representing each variation, are to be exposed at each location. In other words, there will be approximately 600 plates at each point of location, comprising a number, as I said before, of about 7,000 plates.

Now, the method of exposing the specimens. These specimens will be mounted in such a manner that no part of the plated

specimen will be in contact with any of the metal, by the use of porcelain insulators.

The laboratory tests: These tests will include stripping, porosity and accelerated corrosion. In the laboratory tests, we want to find out which laboratory test is best for us to determine quickly what to expect from this particular plate in the field, in service.

The present status of the program: Additional tanks and equipment have been installed at the Bureau. They did quite a bit of revamping down there, new tanks were purchased, everything had to be hooked up, and most of you know what it means, the many details before you get started. So that was our job several months ago. About 500 of the 7,000 specimens have been prepared. The plant is being operated from 6:00 a.m. to 6:00 p.m., so government hours don't mean a thing to us. We are doing this in order to make maximum use of the equipment available. Barring unforeseen circumstances, we expect to have the 7,000 plates ready for the field by November 1 of this year. I have here a plate all set, ready for the field. After the plate has been finished, we snip off this flap, and we spot that point where of course the green metal is exposed to the atmosphere, if it were not protected by some means, and also we spot the stencil marks. Of course it is to be assumed that this point will break down sooner than the rest of the plate; that is, we expect that. But in order to overcome that point, we applied a special enamel, an air-dried enamel, for that purpose.

I don't know whether you realize the amount of work involved in plating these specimens. At least I didn't when I first went down to Washington. I thought it was going to be a one-man job. At the present time, it keeps three of us hustling from 6:00 a.m. to 6:00 p.m., as I said before. We have one man come in at 6:00, another man at 10:30, and we have a third man during the day, so you can rest assured we are doing our best to get this out as fast as we can, because we want to get some information on what's what. [Applause.]

CHAIRMAN LOPEZ: You have heard the reading of this paper. Are there any questions?

MR. MATHEWS: I would like to ask what committee of the A. S. T. M. is coöperating in this work with the A. E. S.

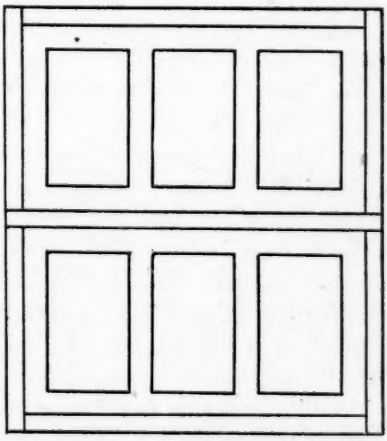
DR. BLUM: It is Sub-Committee VIII, of Committee A-5. That is a committee of which Mr. Hull is chairman, on ex-

posure tests. These are being included along with the other exposure tests on iron and steel, and the Chairman of Committee A-5, of the A. S. T. M., is approving all the expenditures of the A. S. T. M. for this work.

While we are anticipating and waiting for more questions, there were a few points—it was impossible to cover all the details—there were just some remarks around me that showed some things you might be interested in.

This lot of steel was made especially for us at one heat of steel very carefully finished so as to get a uniform finish. It is not quite as high a polish as might be produced by polishing steel with good conditions, but on the other hand, it is more uniform than we would get if we or even others more expert than we, tried to polish 7,000 of these specimens. So we are taking this just as it comes to us. It is greased to protect it from rusting.

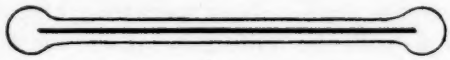
Another point that I think might be of interest is the shape of the racks used for plating these specimens, because that has a great deal to do with the uniformity of the specimens. It is no criticism of the previous tests that have been made on the plated coatings to say that there was not, in most cases, enough information regarding the uniformity of the specimens. Now, these are being plated in this way: [Draws diagram.]



You simply have a rack made of 1″ strip steel, and this with a suitable hanger above, and then these specimens are held in position in that way, six in each rack, so that there is a uniform spacing of a quarter of an inch all around each specimen. And this rack is not insulated, because we want it to serve as a thief. In other words, these six plates with that metal rack, are as nearly as possible, to one large piece of metal, with the slight difference that we leave this quarter of an inch between the plates so that the coating will be a little thicker at the edges than the center, because we don't want the edges to fail first, because that

is a condition that is very hard to measure. Now, by simply manipulating the conditions, the size of this rack and the depth of solution, and the position of the anodes, just by guess and try, we have gotten this so that we can weigh these twelve plates (we plate two of these racks in a tank at once) and we can weigh those twelve plates the first run, every set of conditions is on a set of twelve weighed plates, and those must agree within plus or minus 2%, before we go ahead and plate the rest of them. It means if there are 500 specimens of a certain kind plated, they will have the same total weight of metal on each specimen within plus or minus 2%. You will agree with me that is better than you can hope to do under commercial conditions, but we want this to be uniform.

We have also examined the cross-section of the specimens, and if you imagine that that is greatly magnified, we get a condition like that:



Say we have a thousandth of an inch of nickel on here, we will have out here on the border about 50% more.

We mention those things because that took a lot of care and trouble to work out the details, but we believe it will be worth while. If, for example, you plate five or five hundred specimens under otherwise perfectly good plating conditions on a rack, you may find that 10% of them will be a whole lot heavier than the rest, when you put them out in the field, and it might be out of five specimens you have one heavy one and four light ones; you try to draw your conclusions, and you don't know. Or in another case, you might have one light one and four heavy ones. In this case, we are trying to make this as uniform as possible.

And the last thing, before any plate is wrapped up to be preserved for the test, it is inspected. That means if there is a physical defect, it is thrown out. We don't want to know what defective steel does, but we want to know what otherwise good plate will do under ordinary exposure conditions, so we are going to many details that might not be apparent.

MR. F. J. HANLON: What preparation is being made to investigate these plates again before the exposure tests are made? Isn't it possible that there might be a variation in the corrosion test on

those that have been plated now and those that will be plated two or three months later?

DR. BLUM: While that is a possibility, we are guarding against it by very careful conditions of storage. These plates, as soon as they are polished, then they are cleaned with carbon tetrachloride to remove the grease, and then spotted so as to cover the number and the bare spots so that those places will not corrode first. Then they are inspected and wrapped first in sheet filter paper in groups of five, and then wrapped in heavy waxed paper, to be put in storage until such time as we are ready to take them in the field. So that, humanly speaking, we believe those are perfectly protected from corrosion until such time as we are ready to put them out.

MR. HANLON: The reason I asked the question, we had an experience of that character, where we had work that took a long time to complete, and by the time we got the job completed, the stuff we plated first showed signs of checking.

DR. BLUM: I think that that is a very important thing to look into. Of course, there is this fortunate thing, that all the plates of one kind will be made at once. That is, for example, if we have 600 of No. 13 to make, we will run those 600 right away, that is, we make just about 100 to 120 a day, just get through about ten racks a day in our twelve hours, and that will depend, of course, on the length of time of plating, but we have got to average over 100 plates a day in order to get these 7,000 done before November. Now, by having each set done under our careful conditions, and then once a week all the solutions are analyzed and checked and adjustments made.

I am going to give you a little experience to show you that we are learning a lot out of this thing. By the time we are through, we really hope to know something about plating there, and I tell you this just simply to show you the conditions you have got to face. We had worked with a typical nickel solution, nickel sulphide, chloric acid, etc. We had used that for job plating for months, and did our preliminary work, and everything in that, and thought we were all ready to start; we would start off fresh and clean, so we dumped everything out, cleaned the tank perfectly, made a new solution, purified it, removed all the copper, zinc, and iron and everything from it, and started in plating, and we had the most beautiful bunch of pits you ever saw. If we had tried to make

sieves, we couldn't have done any better. We simply tried different things two or three days and so on, and finally came to the expedient which we know a lot of platers are using, and which we tried to avoid because we wanted to introduce no new variables if we could help it. But we put a little bit of hydrogen peroxide in. The pitting stopped, and that was three weeks ago, and 500 plates have gone through there without a single pit of any kind, showing that it was not the hydrogen peroxide, but it was some impurity in the solution which was taken out or destroyed by the hydrogen peroxide. Since then, we haven't had to use any. But I am telling you that to show you we are not running all easy pie there. We have trouble, but we are checking ourselves all along. We had the question of adherence come up. Some of the early plates didn't adhere as good as they could. So now, what we do, every set, we put it through a bending test and an Ericson tester to see if the nickel is sticking on there. If it isn't, we stop until we find out why. So that everything is being checked up as we go along, because we don't want 7,000 specimens all ready to go in the field and then discover something wrong with them.

MR. ANDREW PERRIN: How would you plate a 24-foot brass tube without burning the ends of the tube?

DR. BLUM: Here we have shown in principle the method to be used. In other words, get as nearly uniform current distribution as you can. Of course, you can't do that in a plating job in a job shop—you can't change the length of your tank for each thing you are going to plate, or change the size of your anodes or anything of the sort, but you have simply got to use such methods as this—either adjust the length and position of your tank, anodes, cathodes and so forth, or use this expedient of a thief, such as is very useful in chromium plating, something to keep the current from being excessive around the edges, and simply work on that until you get the conditions that will be uniform.

CHAIRMAN LOPEZ: This is a very important series of tests, and really is going to play a very important part in the future of plating, and I feel we all ought to take a large interest in this work, and any question that you may have in your mind, come forward. Now is the time to discuss this.

MR. ALBERT HIRSCH: I would like to ask Dr. Blum are these plated in cold solutions?

DR. BLUM: We have all of those variables—temperature of solution, current density, thickness, method of preparation and so on. We had intended to circulate that list, because it is a list of 110 different sets of conditions which have all been considered in conference and agreed on as being most typical for what we want.

MR. J. CAIRNS: I would like to ask Dr. Blum what dip you put them into before the nickel.

DR. BLUM: In the steel—understand we make variations in the cycle to determine the effect, but what we call our standard cycle of cleaning is this. These are coated with grease, so first we remove most of the grease with carbon tetrachloride. Then we run them in an electrolytic cleaner, rinse, and then run in an acid pickle, sulphuric acid pickle, for about two minutes, and rinse and go right into the nickel.

MR. BROWN: I would like to ask how the buffing is taken care of in these various coatings—how you avoid cutting through the edges, or getting different thicknesses over the plate.

DR. BLUM: There again, we have tried to standardize the buffing and the buffers, and we have got some very interesting results. There are going to be a lot of by-products from this work which will be very interesting. Because there is no use of very carefully weighing up the specimens and getting exactly a thousandth of an inch of nickel on, and having one fellow buff off half a thousandth and another fellow buff off a ten-thousandth, because the specimens wouldn't mean anything. So we would give six weighed specimens to the men doing the buffing. There are three men doing that. We had them buff them. They were nickeled, and they just buffed them until they got a bright surface there. They were using the same wheels and the same composition, and we were surprised to find out how uniform the results were. That is, the losses in weight. This is on buffing one side, because we are only buffing one side. The losses in weight were from fifteen hundredths to thirty-five hundredths of a gram on each specimen, and with an average of very close to twenty-five hundredths of a gram. Now, that twenty-five hundredths of a gram represents about 3% of a thousandth of an inch deposit. No, I beg your pardon. A thousandth of an inch of deposit on two sides weighs about 8 grams, and this is about 3% of the total weight of nickel, but since it is on one side, we have really cut off 6% of the nickel. So, in making our calculations for weight, we have allowed 10%. In other words, we have

allowed one ten-thousandth of an inch of nickel for buffing there. Now, that isn't exactly uniform, because when we have the quarter thousandth plates, they are thinner and come out smoother, and it doesn't take out quite as much in buffing. So we have to guess and try. In other words, when we make a quarter thousandth plate on the first run, find out how much we take off in buffing, and calculate how much we have to allow for buffing, and run it so many minutes. For example, a one thousandth plate under certain conditions, represented seventy-five minutes' plating. That was an hour and a quarter. Well, then, a half thousandth doesn't represent just a half of that, because we have to allow for buffing on both of them, and we have to allow more in a half thousandth than we do with a thousandth. Then, when we come to the edges and so forth, there is the chance of cutting through. But since they are thicker there, we are protected against that.

And then there is this other precaution we are taking. I don't know what you think of this specimen passed around, but we are not trying to do fine buffing. I mean by that, we want to do uniform buffing. So that I tell the fellows, "If you do see a little dull spot or a little scratch in there, don't buff until you get it all out, because by the time you do, you'll get all the nickel or half of it off." So we would much rather put out a sample having a very little scratch that isn't taken out in the buffing than we would just to buff out that scratch and then as a result not know how much nickel we had on there.

MR. OSCAR SERVIS: After buffing those specimens, you leave a film of composition on there. Is that washed off?

DR. BLUM: Yes, in carbon tetrachloride. We tried to think of all the questions that you might think of, but we want you to raise them because we would much rather you raise them now than a year or two from now.

MR. J. CAIRNS: Dr. Blum, I would like you to give us more explanation on this pickle you use, and why you keep them in there two minutes.

DR. BLUM: We can say this, that if we are putting on light coats of nickel, we don't need it; we can, with just a dip in acid, put on a quarter or half thousandth of nickel, and it will stand up in bending and anything else. But put on two thousandths of an inch of nickel on a perfectly polished steel surface, and without a slight etching of the metal, such as you get in a two-minute pickle, we

simply say that it is difficult. We don't say it is impossible, but it is difficult to get anything that will stand all kinds of bending tests afterwards in the ordinary treatment. So that, simply as a standard treatment, we are using about two minutes' acid pickle. It is just barely enough—you can't see the etching of the surface. But we know there is a slight etching.

MR. CAIRNS: What would be the density of that pickle?

DR. BLUM: About 10% by weight of acid. It is 2 normal acid.

MR. J. H. FEELEY: You are nickel, and then are you copper-plating these specimens?

DR. BLUM: You understand our program—we have such things as this. There are four different thicknesses of straight nickel. A quarter, a half, one thousandth, two thousandths, and some variations in conditions. And then we have nickel-copper-nickel. Then we have cyanide copper, acid copper and nickel, and in the nickel copper and nickel, we have nickel cyanide and nickel acid nickel. So we are trying to include all the variables we can, without making the program so lengthy it will take from now till doomsday to do it. So we are trying to include the really essential variables, but not including too many little details; otherwise we would never get done.

MR. J. CAIRNS: I would just like to say a few words. You mentioned there about buffing the nickel and buffing too much off here and there. I am in the skate business, and we find that buffing skates has been detrimental to our business, and we have up till maybe two years ago, started to introduce skates that are not buffed, but nickelplated, and instead of buffing them, we make them uniform in color by dressing them with a Tampico brush and oil. We have used other methods such as pumice stone, but even that is detrimental, and we use the Tampico brush and oil, and find there is quite a call for them.

DR. BLUM: That raises a question which we have considered, as to whether there was any large field for unbuffed nickel for exposure outdoors. We had assumed that practically all the uses of nickel involved a high finish, either with or without the subsequent chromium. Now, what Mr. Cairns says indicates there may be some field for an unbuffed nickel. Of course the difficulty there is that on skates probably the differences that you get between buffing and the other method are due to the danger of cutting through somewhere. Now, to the extent that we can prevent

that by having these square plates there, there is less danger of our cutting through than there would be on the edges of skates or anything of that kind.

MR. CHAFFEE: Speaking of a field for unbuffed nickel, I represent a firm making fasteners. Of course, all of those are unbuffed.

DR. BLUM: On steel?

MR. CHAFFEE: On steel and brass.

DR. BLUM: It may be we will have to include a few unbuffed samples in the exposure tests.

MR. FRANK BOWERS: I would like to ask Dr. Blum if he ever tried to plate chromium over nickel without it being buffed.

DR. BLUM: We have not had occasion to do that. Of course, we can predict in advance that it would be difficult, to say the least, to produce a bright deposit of chromium on an unbuffed nickel. But I don't believe we have ever had occasion to do that. No doubt it can be done, but I don't know what results would be obtained.

MR. PERSON: I was wondering why you buff these products.

DR. BLUM: For the reason I mentioned, that at least 90% of all the uses of nickel are of buffed nickel, and we at least under these conditions of buffing will still have much more uniform distribution than what would be obtainable under commercial conditions on irregular shapes.

There is a question. I believe, as pointed out, it might be well to include a few unbuffed samples to see whether the buffing increases or decreases the protective action, but I think we want to make the deposits as nearly like commercial deposits as we can, and still have them as uniform as possible.

MR. BROWN: Are you including any lacquer films?

DR. BLUM: We are not. Of course, the subject of lacquers as such is still another subject and, as far as we know, lacquer is rarely if ever used on either nickel or chromium.

MR. BURROUGHS: What proportion of acid do you use?—Are there any advantages of sulphuric over muriatic acid?

DR. BLUM: There is no necessary advantage there. We debated there about using sulphuric or muriatic, hydrochloric, acid. One, purely a matter of convenience, is that we can keep the sulphuric acid in a lead tank and use it at any time we want to, whereas with the hydrochloric acid we would have to use a stoneware tank. It is purely a matter of convenience.

MR. MCKAY: I would like to ask Dr. Blum what you are doing to standardize methods of cleaning prior to these plating tests.

DR. BLUM: We did not plan any extensive variations in the cleaning or pickling procedures. We have a few, that is, we expect to include ordinary pickling and electrolytic pickling in sulphuric acid, dilute sulphuric acid and also the anodic pickling in concentrated sulphuric acid. Those are the only variations we have in the method of cleaning.

MR. SAMSON: I would like to ask what method of buffing will be used on cadmium.

DR. BLUM: We did not anticipate buffing cadmium or zinc finishes, because there again I think it is safe to say that 90% of all the cadmium and zinc that are used are used in the unbuffed state. I think that would be a fair estimate.

CHAIRMAN LOPEZ: If there is no further discussion, we will now go on to the next paper, which is, "Further Developments on Low pH Nickelplating," which will be presented by Mr. W. H. Phillips.

BRANCH NEWS

WATERBURY BRANCH

It was with considerable surprise and grief that the many friends of the late John W. Slattery learned of his death, which took place in this city Saturday, January 16. For many years Mr. Slattery was a resident of Bridgeport, moving here five or six years ago, to take charge of the finishing department of the Steele & Johnson Company. Although a member of the Bridgeport Branch, he frequently attended the local meetings where his presence, remarks and advice were greatly appreciated. Burial was in St. Mary's cemetery, Norwich, Conn.

The January meeting of the branch was well attended, the entertainment committee presenting as the speaker of the evening Mr. H. W. Mac Fayden, of Hartford Branch, who read a paper entitled, "The Successful Foreman." An exhibit consisting of special finishes on metal and bakelite, and for which Mr. Mac Fayden was awarded first prize at the Washington supreme convention, was also displayed and instructions given as to how to produce same. Much favorable comment was heard on Mr. Mac Fayden's paper coupled with his exhibit.

The chemistry class, under the guidance of Ellsworth Candee and Earl Couch, report great progress. The entertainment committee reported that a speaker had been engaged for the meeting, which takes place Friday evening, February 12.

W. F. GUILFOILE, *Secretary.*

ELEMENTARY COURSE

in Chemical Analysis of Plating Solutions

IN ORDER to familiarize the membership with the work of the Bureau of Education we are sending each Branch a copy of the "Elementary Course in Chemical Analysis of Plating Solutions." The object of the course is to devise a "Definite Plan" for the conductance of Classes for Platers by Branches that do not have classes. The booklet contains directions for sampling, use and care of apparatus, preparation of standard reagents, analysis of nickel, cyanide copper and chromium solutions.

One hundred copies of the booklet have been mimeographed. Each Branch and district chairman will receive a copy free. The balance, or approximately seventy copies, are to be sold at one dollar each.

Should conditions warrant, additional copies will be mimeographed. All copies over the first hundred will net about 40% profit, which will be donated to the Research Fund. Copies of the booklet can be secured through your branch secretary, or by writing to Albert Hirsch, 1945 W. Airdrie St., Philadelphia, Pa.

Remember, when you purchase this booklet you are helping the Research Fund

ANDERSON BRANCH

The meeting was called to order at 7:45 p.m. January 4, 1932. Roll call of officers showed Messrs. Kaegi and Sanders absent.

Minutes of the December meeting were read and approved.

The Treasurer announced the bills due the Short Printing Co. and the Supreme society since before the closing of the Citizens' Bank had been paid.

Mr. Onksen inquired whether or not the branch intended to have an annual banquet this year. Mr. Cleaver announced that a general chairman would be appointed within the week, and called upon all members to lend him their support in making this year's banquet an even greater success than that of last year.

The president announced the next educational session for January 18 and urged all members to attend.

A discussion of future programs was held, the following general suggestions being made:

1. Have members review significant articles in Metal Industry, Metal Cleaning and Finishing, and other current plating periodicals.
2. Have a full Question Box at each regular meeting.
3. Have an outside speaker at almost every meeting.

The meeting was then turned over to Dr. Cotton, who found in the Question Box the following questions:

Question—Can you electro-clean with A. C.?

Answer—An answer, by Oliver Sizelove in the latest issue of "Metal Industry," was read in reply.

Question—What metal can be used to make a pump to filter hot low pH nickel solutions?

Answer—Pure nickel, nichrome, duriron (not machinable).

Question—What is the cause of black lines in die-cast nickel-plating?

Answer—Deposition of metal by immersion due to using too low voltage to overcome the polarization voltage of zinc.

Question—Why does plate peel from die castings when voltage is increased?

Answer—Various answers by members included "poor cleaning," "add sodium chloride," and "possibly too much zinc dissolved in the solution." Note—The presence of zinc in the solution proved to be the real cause of the peeling—R. M. W.

Question—What is the cause of black streaks in a cyanide copper deposit, radiating from points of highest current density? The deposit was over an acid copper plate. A sample was displayed by Mr. Wagner.

Answer—(a) Use 10 oz. gal. Cu CN solution. This is impractical, due to heavy dragout.

(b) Use reducing agent in solution. This gives only temporary relief.

The meeting adjourned at 9:45 p.m.

R. M. WAGNER, *Secretary-Treasurer.*

EDUCATIONAL SESSION
and DINNER DANCE
of the
CHICAGO BRANCH

CONGRESS HOTEL, *Michigan Ave. and Congress St.*

on Saturday, February 27, 1932

The Educational Session will be held in the Florentine Room, 3rd Floor, at 1:00 p.m. The following papers will be presented:

Microscopic Photography of Electro-deposits on Radiator Shells
By DR. OLIVER P. WATTS, Michigan University

Pitting of Nickel Solutions
By WM. PHILLIPS, Gen. Motors Corp.

Deposition of Chromium on Articles Made of Sheet Zinc in the Automotive Industry
By CHARLES H. PROCTOR, Founder of A. E. S.

Corrosion
By C. E. CLINDININ, Gen. Spring and Bumper Corp.

Investigations in Tungsten Deposition
By J. RHEINHART, Western Clock Co.

Plating of Stainless Steel
By Jos. HOEFER, Crown Rheostat & Supply Co.

The banquet will be held in the Gold Room, at 7 p.m.

ALL PLATERS AND THEIR FRIENDS ARE INVITED

ANDERSON BRANCH

The meeting was called to order by Mr. Cleaver at 7:45 p.m., December 7, 1931.

Roll call of officers showed Messrs. Phelps, Onksen, Sanders, and Cotton absent.

Minutes of the last meeting were read and approved.

Letters from Mr. Walter Fraine and Mr. Colin G. Fink, relative to the Research Fund and the Electrochemical Society, respectively, were read.

It was voted to send Mr. Fraine a check for one-half of our pledge to the Research Fund.

A letter from the Los Angeles Branch asking our opinion regarding the recent decision of the United States District Court in the United Chromium Corporation's recent patent suit was read.

The secretary was instructed to reply that Anderson Branch does not wish to go on record as expressing any opinion on this matter. It was agreed that the Supreme Society, if anyone, should answer the Los Angeles Branch's question. An informal discussion was held on the subject, however.

A letter to Mr. Gilbertson, and an invoice for per capita tax were read, and the latter ordered paid.

Mr. Shockley made a report for the membership committee and announced a meeting for the next Monday night.

The investigative committee appointed for the application of Gail Eldridge reported favorably, and Mr. Eldridge was elected to membership.

It was voted to send a letter to Mr. Props explaining that it would be necessary to suspend him unless his dues were paid.

It was voted to leave our checking account in the Citizens' Banking Co.

A discussion of possible speakers for future meetings was held. It was decided to write Mr. Humphries in Indianapolis.

A visit to Mr. Bushman's Laboratory in Indianapolis was suggested by Mr. Shockley, and Mr. Kaegi suggested that Mr. Wales of the Aluminum Coloring Corp.—be approached on the matter of delivering a speech here.

The meeting adjourned at 9:45 p.m.

R. M. WAGNER, *Secretary-Treasurer.*

CHICAGO BRANCH

The regular monthly meeting of the Chicago Branch was held January 9, 1932, at the Atlantic Hotel. The meeting was called to order with President J. C. Kretschmer presiding and all officers present.

All arrangements for the educational session and dinner dance have been completed, the date has been changed from Saturday, February 20, 1932, to Saturday, February 27, 1932. The Gold Room of the Congress Hotel, at Michigan Avenue and Congress Street, has been secured for Saturday, February 27, 1932.

The educational session will be held in the Florentine Room, third floor, at 1:00 o'clock p.m., sharp. The dinner dance will begin at 7:00 p.m.

The following papers will be presented at the educational session: "Mi-

croscopic Photography of Electro-Deposits on Radiator Shells," by Dr. Oliver P. Watts, Madison University; "Pitting of Nickel Solutions," by W. M. Phillips, General Motors Corp.; "Deposition of Chromium on Articles made of Sheet Zinc in the Automotive Industry," by Charles H. Proctor, Founder A. E. S.; "Corrosion," by C. E. Clindinin, Gen. Spring and Bumper Corp.; "Investigations in Tungsten Deposition," by J. Rheinhart, Western Clock Co.; "Plating of Stainless Steel," by Jos. Hoefer, Crown Rheostat and Supply Co.

A special invitation is extended to manufacturers together with their managers, superintendents, chemists, and platers.

Mr. H. A. Gilbertson, chairman of the chemistry class, reports class will start Tuesday, January 12, 1932, at 7:30 p.m. at the Atlantic Hotel.

A demonstration course in electromotive series, Faraday's laws, and their relation and practical electroplating, lecture by Mr. H. W. Faint. Mr. Gus Jelinek will present a paper entitled, "Polishing and Finishing Chrome Steel," at our next meeting, February 13, 1932.

Our members are advised not to miss this meeting.

The business part of the meeting having been taken care of, the meeting was turned over to the librarian, Mr. O. E. Servis, and the following questions were found in the Box:

Question—Some information on silver plating mirrors.

Answer—Write to the Bureau of Standards, Washington, D. C., for booklet on silver plating mirrors.

Question—What is the best way to care for hydrofluoric acid burns?

Answer—Make up a 10% solution of epsom salts in warm water, wash in ice cold water, repeat for 1 hour. Patient should have doctor's care.

Question—What is the best way to satin finish stainless steel.

Answer—This question was held over until our next meeting. There will be a paper on this question.

Question—How should work be cleaned for hot lead dipping; what flux is used? What lead mixture?

Answer—This question caused some lively discussion, most members thought that there were a number patented on lead plating.

Question—Is this a straight cadmium sol. as follows,—sod. cyanide 4 ozs., cadmium oxide 3 ozs., caustic soda 1 oz., water 1 gal., will this be a patented sol.?

Answer—No, this formula is not a patented sol.

Question—A direct current elec. cleaner tank with 1 oz. sod. cyanide and 2 oz. caustic soda with 7 volts. What causes a film on red brass? Which can be rinsed?

Answer—Cleaner is wrong to free caustic and voltage too high for brass cleaning—there are plenty good brass cleaners on the market.

Question—How may the carbonates be removed from a copper cyanide sol.?

Answer—One member suggested freeze out carbonates or throw down carbonates with barium cyanide, and filter sol.

Question—Would like to know about a good black nickel sol.?

Answer—Double nickel 8 ozs., sulphocyanide 2 ozs., zinc sulphate 1 oz., sal amomoniac 1 oz., use old nickel anodes; be very careful in drying work.

PROVIDENCE-ATTLEBORO BRANCH

Meeting January 8, 1932, at the home of the President, Mr. Chas. Chace. The subject of plating "pewter and white metal" goods was resumed from last meeting. Mr. Cahill was present and entered into the discussion, particularly the cleaning end, and suggested several methods in cleaning, to insure a proper surface for the plate. The new "Degreaser Solution" was recommended as very useful if the electro-cleaner was used afterwards. It was stated that some concerns first use electro-cleaner; rinse and repeat, use blue dip (with a little hydrochloric acid), strike, with large excess of cyanide, and not very heavy deposit in the plating tank.

There were nine members present.

JOHN ANDREWS, *Secretary.*

HARTFORD-CONNECTICUT VALLEY BRANCH

The Hartford-Connecticut Valley Branch, A. E. S., held its regular monthly meeting on Monday evening, December 21, 1931, at the Springfield Chamber of Commerce, Springfield, Mass.

The meeting was called to order at 8:45 p.m. with President Fleming in the chair. Minutes of the previous meeting were read and accepted. One bill of $21.53 for our second quarter per capita tax was ordered paid. Two communications were read and placed on file.

After much discussion in regard to the financial condition of the branch it was decided to do all we possibly could to help under these particular stressing conditions, and to do all we could to carry on our research work at the Bureau of Standards.

We were very fortunate in having with us as guest and speaker, through the efforts of Mr. Kennedy, Mr. Van Deran of the Westinghouse Mfg. and Elec. Co., of Mansfield, Ohio. His talk was one of the most inspiring and interesting talks ever held at any of our branch meetings. The members who missed this talk sure missed a lot. In conclusion, Mr. Van Deran was given a hearty rising vote of thanks.

The meeting was attended by only fourteen members and visitors and was adjourned at 10:45 p.m.

V. E. GRANT, *Secretary.*

LOS ANGELES BRANCH

The regular monthly meeting of this branch was held December 9, 1931, on the ninth floor of the Chamber of Commerce Building. The meeting was called to order with President E. W. Francis presiding and all officers present.

The meeting was well attended, 34 members being present. The minutes and communications were read and all bills ordered paid. After Brother Whitman's note was read, Brother Russill made a motion, which was seconded, for the branch to cancel Brother Whitman's dues until 1932. A motion was made to turn a list of the members' names whose dues are past due over to the Board of Managers and investigate each case and make a report at the January meeting.

A motion was made to send a letter of condolence to Mrs. Rhodemeyer whose husband recently passed away. Mr. Rhodemeyer was at the November meeting, and took home an application, but did not send it in, having been stricken with sickness followed by an operation from which he did not rally.

Brothers Brannon, Herbst and Schuler were on hand after an absence of almost a year. They were given a big hand. Mr. Crooks of the Wyandotte Co. and Mr. Dains were also present. Mr. Dains expects to join the Society.

The question of having a banquet in February or March was tabled until the January meeting.

Librarian Coffin read a paper on "Silver Plating," by Mesle of the Rochester Branch, and also found the following questions in the Box:

Question—What causes treeing in an acid copper solution?

Answer—It may be the current. Use dextrine or molasses. Suggest analysis of solutions.

Question—What is a good formula for a die-cast nickel solution that will stand chromium?

Answer—	Single Nickel Salts	14 oz.
	Nickel Chloride	1 oz.
	Boric Acid	3 oz.
	Sodium Citrate	8 oz.
	Magnesium Sulfate	8 oz.
	Water	1 gal.

or add 8 oz. of Glauber salts to the gallon of ordinary nickel solution.

Question—Can die castings be plated in an ordinary nickel solution? If so, how?

Answer—Yes. Clean, scrub, dip in sour water, then rinse, place directly in nickel bath with live current.

Question—What effect has hydrofluoric acid on rhodium plating?

Answer—None.

Question—How can cadmium be oxidized black for relieving for imitation of oxidized silver?

Answer—Cadmium plate first, then plate in black nickel solution, and high-lite.

Question—What causes pits in cyanide copper deposit?

Answer—Poor cleaning and high carbonate content.

Question—Give a formula for white gold solution and tell how to operate it?

Answer—	Water	1 gal.
	Sodium Cyanide	1 oz.
	Gold Trisalyt	½ oz
	Silver Trisalyt	1/3 oz.
	Cadmium Trisalyt	¼ oz.
	Ammonium Chloride	½ oz.

Use 18 karat white gold anodes, 4 volts. Temperature 120° to 140° F.

Between questions the secretary passed out samples of rhodium-plated copper and brass which created an interesting discussion.

The meeting adjourned at 10:30 p.m.

M. D. Rynkofs, *Secretary.*

DETROIT BRANCH

The regular monthly meeting of Detroit Branch was held at the Hotel Statler on Friday, January 8.

It was a very interesting meeting and a paper on "Adhesion," by Mr. George Dupernell, held the attention of the members and a lively and instructive discussion followed Mr. Dupernell's splendid presentation.

A number of our "old-timers" were present, and we hope they will again acquire the "habit" and be with us at all the meetings.

The office of Secretary-Treasurer was declared vacant and Mr. George Kutzen was elected to fill the vacancy, and Mr. Arthur Sutcliff was elected a member of the Board of Managers to succeed Mr. Kutzen, who resigned following his election to the office of Secretary-Treasurer.

The chairman of our Educational Committee, Mr. B. F. Lewis, presided over the educational session. The customary Question Box period was passed owing to the lateness of the hour.

At our February meeting Mr. Charles Eldredge will give us a paper in which he will discuss the progress of electrodeposition in England, France and Germany during the recent past. Those who know Mr. Eldredge know that his paper will be interesting and worth while coming to meeting to hear it and the discussion that will follow.

We have a tentative promise for our March meeting, and we are going to get busy during the spring and early summer for next season's program and classes. The aim of our "regulars" is to make our meetings so interesting that every member of our Branch will become a "regular" in attendance.

GEORGE KUTZEN, *Secretary and Treasurer.*

MILWAUKEE BRANCH

The regular meeting of Milwaukee Branch was held on January 14, 1932, at Lipps Hall, Third and W. Highland. The meeting was called to order by President M. Nishwitz, all officers being present. Milwaukee will not have a banquet this year, but will again have a smoker and educational session as last year. Milwaukee Branch will duplicate the smoker of last year with added attractions some time in April. Date to be announced later. Librarian Henry Binder has made arrangements for a very interesting talk on Low Ph at our next educational meeting.

FRANK J. MARX, *Secretary and Treasurer.*

CLEVELAND BRANCH

The regular monthly meeting of the Cleveland Branch was held on Saturday evening, January 9, at Hotel Winton, President E. Steen Thompson presiding.

The minutes of the December meeting were approved as read.

A letter was read from Mr. Albert Hirsch regarding the booklet on analysis. Some of the members present decided to get some of these.

Copies of the lessons we have had so far in our chemistry class were handed to those members unable to attend the class. These were explained

and members were told that, should they run into any difficulties, they should bring them to the meetings and they would be explained.

After a general discussion a motion to adjourn was carried at 10 p.m.

PAUL STAMM, *Secretary.*

BOSTON BRANCH

Boston Branch met Thursday, January 7, at the American House with President Gale in the chair.

One new member was elected to membership.

The chemistry class committee made a report that the class would start January 19, 1932, at the same place as last year, 97 Haverhill Street, Boston, at 8 p.m. All those that are to attend this class will be there.

A committee of six was appointed by the chair to make arrangements for a luncheon and also to have as the speaker at the next meeting in February, Mr. Oliver J. Sizelove. All that can attend this luncheon will have a good time and it will be very interesting for those that have not heard Mr. Sizelove. The price of the tickets will be nominal.

Mr. Donald Wood of Boston Branch gave a very interesting talk on "Electricity" and was called on to answer all questions. He was given a vote of thanks for his very interesting talk.

The meeting adjourned at 10.45 p.m.

A. W. GARRETT, *Secretary.*

Mrs. A.: How much better off a man would be if he would take his wife's advice.

Mrs. B.: Yes, I have told Charley time and again not to bet on horses that don't win, but he will do it.

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"It's great to be famous. Just think of all the prominent men who die and have their faces on a $10 bill."

"That's nothing. I'd rather be alive and have my hands on one."

—

A bashful young couple, who were evidently very much in love, entered a crowded street car in Boston the other day.

"Do you suppose we can squeeze in here?" he asked, looking doubtfully at her blushing face.

"Don't you think, dear, we had better wait until we get home?" was the low, embarrassed reply.

An Irishman, being joked on the blunders of his countrymen, observed that Englishmen every moment made bulls no less ridiculous. "What," said he, "will you say to ill health, bad success, much too little, vastly little, excessively small, negative success, acquitted felons?"

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The porter of a Dublin grocer was brought up before a magistrate on a charge of stealing chocolate, which he couldn't deny. Upon being asked to whom he sold it, the pride of Patrick was greatly wounded.

"To whom did I sell it?" says Pat; "why does he think I took it to sell?"

"Then, sir," said the magistrate, "what *did* you do with it?"

"Do wid it? Since you must know," said he, "we made *tay* with it."

APPLICATIONS

MR. JACK BRYDEN, 1253 Roscoe Street, Chicago, Ill. (Active).....Chicago
ULRIC J. BOUDREAU, 13 Pickard Street, Amesbury, Mass. .....Boston
GERALD E. TUCKER, 5059 N. Damen Avenue, Chicago, Ill. .....Chicago
F. L. MACNAMARA, 5906 Carpenter St., Phila., Pa. (Asso.).....Philadelphia
G. BYRON HOGABOOM, 34th & Spruce St., Phila., Pa. (Asso.).....Philadelphia
MORRIS WALSH, 3135 W. Columbia Avenue, Philadelphia, Pa.....Philadelphia
LEROY A. DOCKSTAEDER, c/o Horrock Ilbotsons Co., Whitesboro St., Utica, N. Y. .....Rochester
JOHN H. JORDON, 63 Kirkland Street, Rochester, New York.....Rochester

ELECTIONS

ULRIC J. BOUDREAU, 13 Pickard Street, Amesbury, Mass. .....Boston
W. B. RIDEOUT, 54 Canal Street, Medford, Mass. .....Boston
GERALD E. TUCKER, 5059 N. Damen Avenue, Chicago, Ill. .....Chicago
F. L. MACNAMARA, 5906 Carpenter St., Phila., Pa. (Asso.).....Philadelphia
G. BYRON HOGABOOM, 34th & Spruce St., Phila., Pa. (Asso.)....Philadelphia
MORRIS WALSH, 3135 W. Columbia Avenue, Philadelphia, Pa.....Philadelphia
LEROY A. DOCKSTAEDER, c/o Horrock Ilbotsons Co., Whitesboro St., Utica, N. Y. .....Rochester
JOHN H. JORDON, 63 Kirkland Street, Rochester, New York.....Rochester

SUSPENSIONS

MICHAEL GALLO .....New York
CHAS. GIORDANO .....New York
JOHN HEIMER .....New York
C. C. KRAMER.....New York
P. J. RUPPERT..... .....New York
G. M. ROBERSON.....New York
C. J. WERNLUND.....New York
HAROLD LAGENDYK, R. Route No. 11, Grand Rapids, Mich. .....Grand Rapids
CLARENCE STIMSON, 1728 Barkley Street, S. W., Grand Rapids, Michigan .....Grand Rapids

RESIGNATIONS

C. ORR, 164 Albany Avenue, Toronto, Canada.....Toronto
JOHN DYKMAN, 1370 Lafayette Avenue, N. E., Grand Rapids, Michigan .....Grand Rapids

TRANSFER

MR. ROBERT LEDIG, from Rochester to Philadelphia Branch.

REINSTATEMENT

S. SCHUBERT, 33-34 203rd St., Bayside, L. I., New York.....New York

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Sec.-Treas., WALTER FRAINE.....507 Grand Ave., Dayton, Ohio

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WILLIAM F. GUILFOILE.....14 Oakland St., Waterbury, Conn.

DAN WITTIG.....1221 N. Third St., Milwaukee, Wis.

DR. WILLIAM BLUM.....Bureau of Standards, Washington, D. C.

MR. OSCAR SERVIS.....5305 Warner Avè., Chicago, Ill.

MR. N. E. ZADOWSKI.....1383 W. 65th St., Cleveland, Ohio

MR. W. S. BARROWS.....628 Dovercourt Road, Toronto, Canada

C. F. NIXON.....Ternstedt Manufacturing Co., Detroit

DR. H. S. LUKENS.....University of Pennsylvania, Philadelphia, Pa.

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Other Branch Representatives will be printed as received.